Pegaso Project
People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast

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D.3.2.B

Guidelines for data harmonisation

Version 1.

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1. The SDI in the framework of Pegaso project

One of the goals of the PEGASO project is the implementation of a Spatial Data Infrastructure (SDI), following INSPIRE Directive, to organize local geonodes and standardize spatial data to support information sharing on an interactive viewer, to make it available to the ICZM Platform. A Spatial Data Infrastructure is where all data and indicators from PEGASO participants can be shared. Data then will be easily accessible through a web portal.

PEGASO SDI will allow simple GIS manipulation by all users and the downloading of relevant data for more detailed local analysis. And this requires the interoperability between the different data sources provided by the partners. Interoperability means the possibility for spatial data sets to be combined, and for services to interact, without repetitive manual intervention, in such a way that the result is coherent and the added value of the data sets and services is enhanced [INSPIRE Directive]. Interoperable spatial data is the data which is conformant to the harmonised data product specifications.

Harmonisation is a broad topic which involves the adaptation of existing data and services to standards and rules according to the regulations and requirements in an SDI. It represents a main issue for combining of trans-sectoral, trans-lingual and trans-border information originating from different sources.

1.1. Purpose and scope

For the purpose of create an SDI, every partner has to identify its available information used within the project (and to describe it by means of Metadata of data and services). The process of data harmonization is addressed to make interoperable the information shared by the different partners according to INSPIRE Directive principles.

This document is one of the deliverables of the WP3, within task 3.2, being a part of the Deliverable 3.2B. It is based on previous harmonization initiatives such as EURADIN, NATURE SDI+, Humboldt and INSPIRE keeping in mind the development of harmonized data sharing infrastructure.

These Guidelines are aimed at providing support for partners, trying to simplify the harmonization process that requires multidisciplinary experts to deal with the context and the technology.

1.2. What to harmonise

1. The reference system and coordinates system for the whole project map presentation. In this case it has been agreed to use:

— Reference system: ETRS89.
— Projection: LAMBERT AZIMUTHAL EQUAL AREA [LAEA] (ESPG code 3035). [1]

Raw data from any source can be converted from its own system to the new system, by means of the adequate on-line web processing services.

[1] This is what we previously agreed and what is recommended by INSPIRE for spatial analysis. [See D2.8.I.1 INSPIRE Specification on Coordinate Reference Systems - Guidelines]: "o Lambert Azimuthal Equal Area (ETRS89-LAEA) for pan-European spatial analysis and reporting, where true area representation is required; o Lambert Conformal Conic (ETRS89-LCC) for conformal pan-European mapping at scales smaller than or equal to 1:500,000; o Transverse Mercator (ETRS89-TMzn) for conformal pan-European mapping at scales larger than 1:500,000[...]. For regions outside of continental Europe, for example for overseas MS territories, the MS shall define a map projection they consider most suitable for the purpose."
Note: although we are using a different projection in the MapViewer (Web Spherical Mercator), which is necessary to use Google background imagery, this is not an issue, as we can still use ETRS89-LAEA for area calculations, while still using Spherical Mercator for visualization.

2. Small-scale maps, continuously covering the project areas, mainly used as background for the representation of other data (e.g.: indicators, localization of use cases, widespread administrative limits, etc.). Examples would be the OSM maps, Google Maps, UNIGE.
3. Services: Discovery, Visualization, Download. This topic has been explained in the Deliverable ID 3.2.1. “SDI implementation Guidelines”.

4. Metadata and Catalogue. See Deliverable ID 3.2.1.

5. Spatial Datasets and Spatial Objects, necessary for the calculation and representation of indicators. This topic will be treated in this document.

6. Portrayals. Symbolization, colour of layers and related aspects should be also harmonized. This topic will be treated in this document.

7. Feature Data. A Feature Catalogue and Feature Concept Dictionary, from INSPIRE resources, should be the basis for the harmonization of concepts, definitions and semantics of spatial objects and geoinformation being managed within the project.

1.4. Reference documents

The previous documents related to current one are the following:

1.4.1. Internal documents

Deliverable ID 3.2.1. “*SDI implementation Guidelines*”, available on the intranet. Link to the document

Deliverable D.3.1. “*Report on the inventory of Participants and main relevant EU Projects data and SDI, with a Quality assessment and identification for needed actions on harmonisation tasks*”. Available on the intranet Link to the document

2. Indicators for Pegaso

2.1. Introduction

An indicator is a proxy measure of information that can describe an abstract concept. It’s measured in percentages, rates and ratios to allow comparisons. The PEGASO indicators take the form of statistics, state or percentage or combination thereof.

— The indicators will form the basis for the implementation of ICZM governance understood as outlined in the Report of the Project.

— They are constructed from basic or reference information, which are applied as appropriate calculation algorithms (mathematical operations, weighting, algebraic, etc.) to set the value of the indicator.

— With respect to PEGASO Project, we should summarize the main features that come together in the creation, maintenance and representation of indicators that will be developed under the project:

— Each partner shall calculate the indicators that correspond to its area of activity/study/ within the project (CASE, island, river, city, province, county, etc).

— Each indicator refers to a specific characteristic that affects an area or territory. Within each area or territory several "scales" can be identify and calculate resulting in different indicator values. For example, if the scope is the country coast, partner/s whose action unfolds along this area draw up indicators at

different territorial levels: at the city level, or level of protection zones or special or regional level, and so on.

— The indicators are made from a "reference" or basic information, to which an algorithm of calculation (percentage, division, addition, etc..) is, usually, applied to determine the value of the respective indicator. This basic information must have the same geographical area than the indicator to be calculated.

— The indicator value may change with time, from changes in the basic information from which it was generated. This basic information comes from a particular source, corresponds to a certain date (drawing-creation?) and supplied by a particular means of access (URL, FTP, Web page download, CD / DVD, etc).

— The same indicator reaches different values for the different areas considered (cities, counties, biomarine areas....). In this vein it is essential to define:

  - The number of ranges of values to consider
  - Colour or colour range for representation
  - Where applicable, symbology

— The meaning of each indicator should be clear, shared by all partners, so that information is handled with the same semantic content.

2.1. Objectives of the harmonisation process

Although in the *Introduction* explicit reference has been made to the need to harmonize the data and services to be provided by different partners through the PEGASO SDI, a brief summary of the objectives and tangible results to be achieved through the implementation of the harmonisation process is summarize below:

— To harmonize the meaning and presentation of indicators: same basis of calculation, the same type of basic information and statistics, same symbolic representation (colours, symbols, ranges, etc.).

— To be able to recalculate indicators, from basic information, either to establish new ranges of values, either due to the needed of updating such basic information as appropriate.

— To allow the standardization of the indicators in the wide scope of the project, as well as with respect to local areas.

— To achieve clear identification and description of the areas referred to the indicators, and its link to basic information and indicators.

— To provide data to third party users, via SDI, in a standardized way (relationship or similarity to INSPIRE specifications).

— To develop and publish metadata as basic information (if not previously exist) as indicators.

Conditions to avoid:

— Lack of homogeneous meaning between indicators created by different partners related to the same topic. This means that comparison between the same indicators will not be possible. All partners have to share the same semantics and concepts related to the same indicators.

— Outdated indicators due to the impossibility of recalculation when the original information changes.

2.3. - Harmonisation proposal

Harmonize or unify the data model for the basic or reference information and for the indicator itself (reporting information). Determination of the data structure to accommodate the baseline for the indicators applicable to all partners.

Harmonized representation, defining value ranges, colours, symbols, and spatial characteristics of the object that represents the field of value (polygons, lines or points that represent the geographical area to which the indicator refers).

Implement the INSPIRE specifications on Area Management / restriction / regulation zones and reporting units, particularly those relating to the application schema of Reporting Units.

Use of the INSPIRE Feature Catalogue and feature concept dictionary. Available at: http://inspire-registry.jrc.ec.europa.eu/

2.3.1. Harmonization of the Reporting Information Data Model

- Development of a Data Model in which among other data it will contain the basic information (or an online reference access to it) the algorithm calculation, etc. (see model draft) for each indicator. A link to Metadata and Factsheets describing every indicator should be desirable.
- Use of the INSPIRE data feature dictionary and feature Catalogue, for the definition of basic information to use or, where appropriate, the indicators themselves.
- Identifier management following INSPIRE Implementation Rules (IR).

2.3.2. Harmonization of presentation / display of results

- Each partner may publish their own WMS with the representation of the preferred indicators, while a layer must maintain the characteristics of homogeneity that will have been defined for the project (range, colours and symbols). Therefore, one can connect from the hub to the different local nodes while maintaining the same data model and representation.
- Other indicators would be developed from the central node, from gathering basic information, which once published in WMS, may also be used by the local nodes.

2.3.3. Harmonization of reporting units

- As much as possible, the georeferencing method, to reference spatial data, using already existing spatial objects (indicators and reference information) will be used.

2.3.4. Use of INSPIRE feature catalogue and concept dictionary

- The feature concept dictionary will allow sharing harmonized definitions and descriptions of all spatial object types, facilitating the cross-referencing harmonization of indicators.
- The feature catalogue will allow agreeing in the meaning of the spatial object types as well as the properties of these objects.

3. Reporting units for spatial representation

The PEGASO indicators refer to zones or geographic areas: Coastal zone, buffer of 10 km of coastline, municipalities or NUTS, sea areas, etc. However, some of them will be represented by means of the European geographical GRID.

Zones or geographic areas to reference indicators may be specific to this indicator or correspond to known and predetermined areas (e.g. a country, region, city, national park, etc.). **A Reporting Unit** can be defined as any collection of spatial objects to which reporting information can be associated or linked to.

Consequently, the most appropriate way to graphically represent the indicator values in these areas should be by means of the already described and existing spatial objects like NUTS, bioregions, etc., that is by georeferencing spatial data to already existing spatial objects.

In this respect, the "INSPIRE Conceptual Model" document states that the *object referencing significantly enables improvements in data integrity and reliability*. However, object referencing has proven to be a complex subject, in particular because the use of object referencing is not widespread today. Most spatial data sets today are data sets that are self-contained; even in cases where geometries are reused from other spatial objects in other data sets; these geometries are often copied instead of referenced usually.

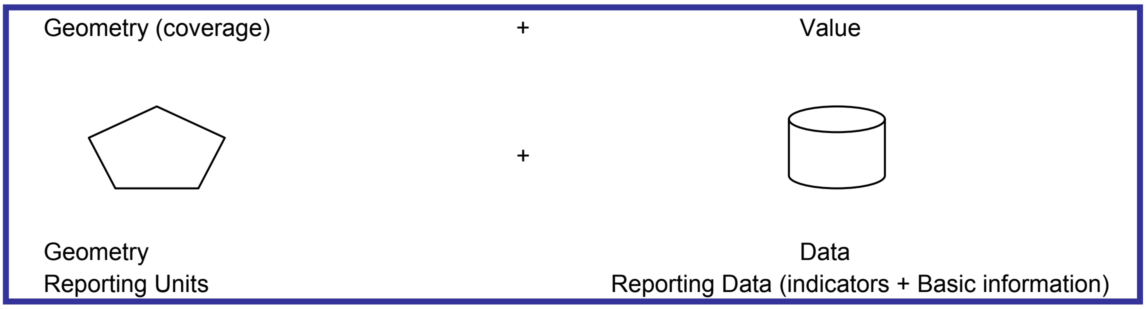
There are many reasons behind this issue being the following the most important:

- GIS tools provide better support for self-contained data sets and spatial objects,
- Limited availability of reference objects via reliable network services,
- Lack of reliable and stable identifiers,
- More complex life-cycle management, and
- Performance concerns.

To some extent, this is similar to the changes from self-contained documents to a document web connected by hyperlinks. Therefore, we must distinguish between spatial objects (points, lines or polygons area delimiters) and the information that is represented using them. For example, a 3rd NUTS level indicator can represent and receive vital statistics, a political, economic and other indicators. Therefore, the same space object (in this case a NUT polygon) can be used for the spatial representation of many different indicators or background information.

In the PEGASO Project, we propose to use the INSPIRE spatial objects called "**Reporting Units**". Using such objects, in many cases already defined in the INSPIRE IR, we will represent the results of PEGASO indicators and, where interesting, the very basic information. Since any indicator requires a Zone or Area of representation, it may consist of any Reporting Unit already covered by the Directive or a new spatial object not covered by it. In the first case it is possible that at the time of having to be used by the Project, the INSPIRE spatial object does not still exists, so we will have to create it expressly for its use in PEGASO. In any case, the generation, application schema and structure of these objects will follow the rules of the INSPIRE spatial specification of the Reporting Units (Currently included in the Draft Document "Area Management, Restriction Zone and Reporting Units Implementation Rule").

Summarizing, the PEGASO indicators will be composed by two objects, the geometry and the value as follows:



The **Geometry** will be defined following the common application schema and harmonized as stated in the INSPIRE IR for Reporting Units. The **Data** is defined by the data model / schema, and is based on a common application for all indicators + complementary fields according to each type of indicator.

The Reporting Units are seen as spatial objects that provide the spatial extent for related reporting information. Therefore, reporting units can be almost any spatial object from any INSPIRE Annex Theme.

The Reporting Units application schema does not include the details about the spatial object types that form the reporting units. This responsibility is with the other INSPIRE Annex themes or thematic domains, which can directly include the attributes required for the reporting or can define application schema for spatial objects that do not correspond to any INSPIRE Annex theme. The Reporting Units application schema provides some other information about the reporting, for which the reporting units have been formed, such as reporting period, reporting obligation and reporting authority.

3.1. Narrative description and UML overview of Reporting Units

3.1.1. Reporting Units

The Reporting Units spatial object type shall act as a container feature that defines the reporting instance and provide either references to the spatial object that forms the spatial. The Reporting Units spatial object type is comprised of the following attributes:

— INSPIRE Identifier: unique, persistent identifier used to identify the reporting units.

— Reporting Unit Name: name of the spatial object type that forms the reporting unit. This is required to enable discovery and selection, where there may be multiple reporting units.

— Reporting Period: time defining the reporting period to which the reporting units are applicable.

— Reporting Authority: Public Authority responsible for submitting the reporting units dataset to the relevant reporting authority; (not applied in PEGASO).

— Begin lifespan version: the spatial objects contained within the unit attribute, represent a snapshot version of the dataset from which they are derived. This property shall be used to capture when this snapshot was generated.

— End lifespan version: date defining when the version of the reporting units dataset was superseded.

— Unit: Reference to or inline encoding of the spatial object representing the reporting unit.

— Reporting Obligation: summary of the reporting obligation that requires the generation of the reporting information for which the reporting units provide the spatial extent; (Not applied in PEGASO).

— Related Reporting Information: this property can be used to link the reporting unit to specific reporting information objects, where known.

Note that reporting unit evolutions across time can be represented. It is possible to trace how these units have changed across time. The evolutions supported are creation, deletion, modification, aggregation and splitting. These evolutions can be represented explicitly by means or the lifecycle attributes.

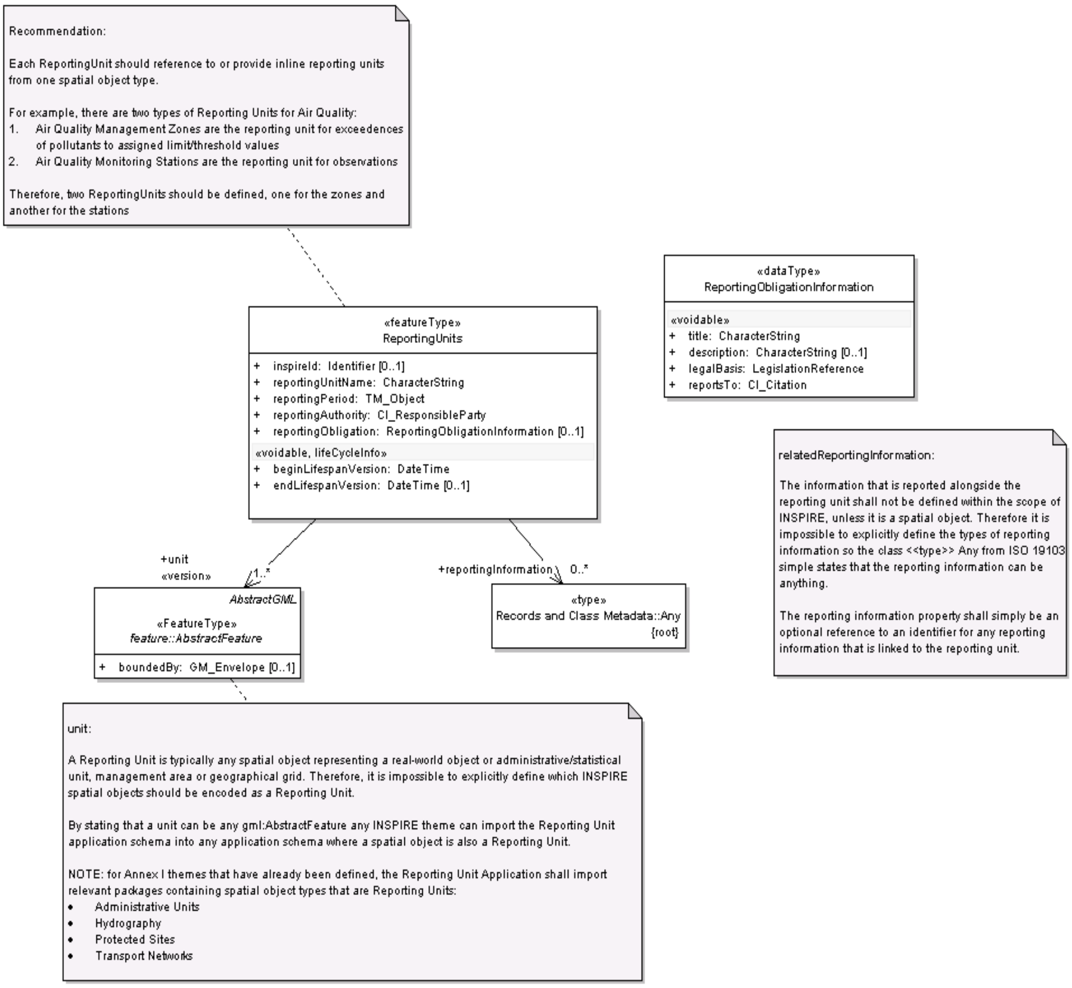
Whether it is necessary the creation of new R.U.'s, because those needed are not available or are not complaint with INSPIRE model, partners or WP3 will prepare new files accomplishing the content required and described above. Also new Identifiers will be created for these spatial objects.

3.2. The European GRID ETRS89_LAEA_1km as PEGASO Reporting Unit

It is intended to use the mentioned Grid, as defined in INSPIRE Specification "Geographical Grid systems", to harmonize the results, at project level, of the so-called "Ecosystem accounting tool" to be developed by the UNOTT, based on the methodology for setting territorial LEAC indicators, and the "Cumulative Impact Index", to be developed by the UAB, based on coastal sea areas, also based on LEAC. The representation of results would be harmonized by using the Grid for both, and would be useful for evaluating multiscale parameters.

In all cases, accurate data, and its location and the availability are key factors to enable the implementation of these previous indicators. For this purpose, the Grid is available and can be downloaded (approx. 80 Mb), through PEGASO Catalogue. In addition, the PEGASO Catalogue will include the available Reporting Units, to be downloaded and used by the partners in indicators and tools calculations.

Figure 1. Reporting Units Application Schema



Source: Data specification on Area Management/restriction/regulation zones and reporting units.

3.4. Current Reporting Units considered by INSPIRE and provided by different organizations

3.4.1. Statistical units

A statistical unit informs on the statistical data location, the statistical data refers to these objects through their identifier. Statistical units are usually represented as:

— Vector geometries (points, lines, surfaces), mainly surfaces. Area statistical units usually compose a tessellation.
— Grid cells: they are spatial features (Polygon, Line, Point or Grid cell) that can be used to attach statistical information. Examples are NUTS, LAU1, LAU2, GRIDS, Population Distribution.

3.4.2. Sea regions

Sea Region is a defined area of common (physical) characteristics. An Oceanographic Geographical Feature represents the (physical or chemical) properties of the Sea Region. Some examples are: Sea, Sea Area, Marine Circulation Zone, Intertidal Area, Shoreline, Shore Segment, (ex. Marine Administrative Zone, Territorial Sea Area, EEZ, Sediment Cell, Circulation Cell, Seabed Area, Exclusive Economic Zone…), Marine Boundaries, IHO Sea Areas, Marine Eco-regions of the world, ICES Eco-regions.

3.4.3. Habitats and biotopes

Geographical areas characterised by specific ecological conditions, processes, structure, and (life support) functions that physically support the organisms that live there. Includes terrestrial and aquatic areas distinguished by geographical, abiotic and biotic features, whether entirely natural or seminatural.

3.4.4. Biogeographical regions

Areas of relatively homogeneous ecological conditions with common characteristics. Example: Environmental Stratification Europe, Natural Vegetation Europe.

3.4.5. Protected sites

Natura 2000 sites, Biosphere reserve, UNESCO sites, Ramsar Sites.

3.4.6. Area management/restriction/regulation zones

Environmental quality, environmental and natural resources, control risk, health, development/spatial planning,

— Protect and improve environmental quality
— Protect environmental and natural resources
— Protect and control risk from natural and man-made hazards
— Protect plant, animal and human health
— Control development/spatial planning

In the Annex V of the Deliverable D.3.1 an Inventory and preliminary assessment of the European databases and datasets which can be used as Reporting Units or as georeferencing spatial objects can be found. Link to the document

3.5. Scales of indicators representation in PEGASO

From a first overview of the list of proposed indicators providef by wp4 and their characteristics and coverages, it can be said that the different scales of representation will be, mostly:

Table 1. Principal scales of representation for indicators

EEZ
Territorial waters
Subnational, Coastal zones
National (country)
Local (municipalities?)
Coastal ports
ICZM Protocol compliance reporting

Therefore, it should be desirable to elaborate, once the final list of indicators and tools are available, the most common reporting units which will be used in the indicators representation, from the different available sources of thematic datasets.

3.6. Style representation of the R.U.

3.6.1. Layer representation

The layer representation can be defined as follows:

Table 2. Style for layer representation.

Layer Name	Layer Title	Spatial object type(s)	Keywords
AM. Reporting Unit	Reporting units	<Name of the spatial object	reporting units

3.6.2. Style Abstract:

- Reporting units with **point** geometry are rendered as a square with a size of 6 pixels, with a 50% grey (#808080) fill and a black outline.
- Reporting units with a **curve** geometry are rendered as a solid black line with a stroke width of 2 pixels.
- **Polygon** reporting units are rendered using a 50% grey (#808080), 30% opaque fill and a solid black outline with a stroke width of 2 pixels.

3.6.3. Symbology

For this symbology see: User Style_AM_Reporting Unit_Default.xml (definition of the style) from the INSPIRE document "Data Specification on Area management/restriction/regulation zones and reporting units".

4. Harmonisation of Reporting Information

The 'Indicator data' are defined as the data directly needed to calculate (and spatially represent) the (core set of) indicators. This indicator set will be selected and their definitions will be elaborated by WP4 (task 4.1). This set of indicators will follow from the ICZM Policies, and particularly address the elements and articles from the Bucharest and Barcelona Conventions and from the Strategies focused on delivering ICZM and measuring Sustainable Development in coastal zones.

Indicators sets will include:

1) ICZM Progress Indicators, to evaluate the degree of implementation and compliance with the established in the relevant ICZM Policies

2) Indicators of Sustainable Development (ISD) to measure the evolution towards more sustainable coasts (land and sea) according to the goals set in the ICZM Policies

The ISD will consist of a core set of indicators, which due to their high degree of relevance for the EU or regional ICZM policies will have a basin-wide application. Next to this core set, a number of additional indicators can be selected from the set of indicators, to fulfill local objectives. The selection criteria for the latter will be based on participative processes involving all CASES/partners, starting from a proposed list/set by the WP4.1 team and validated by members from the wider PEGASO consortium

A common data model for each one of the indicators will be defined. Two levels of information can be defined:

- *Generic level*: generic characterization of the indicator (conceptual). This will be collected in the Factsheets agreed for every indicator, but also a database containing this generic information will be created in order to allow a better management of the indicators system. The number of records will coincide with the number of the different indicators.

— *Specific level:* concrete instance of the indicator, related with a partner, area and other items. The basis for the design of the Generic level data model will be the “indicator fact sheet” (see below).

Table 3. Fact sheet (draft version) collecting the principal characteristics of indicators.

Indicator (name)	
Nr.	
Objective of the indicator	
Policy context	
ICZM Policy Objective	
ICZM Protocol Article	
Relevance of the indicator for ICZM Phase(s)	
UNEP-MAP Ecological Objective	
Spatial consideration	
Coverage	Resolution
Temporal considerati	
Period	Resolution (time interval or unit)
Parameter(s)	
(i)	
(ii)	
Calculation method	
Steps	Products
1	
2	
Current monitoring	**Data sources**
Assessment context	
Use of the indicator in previous assessments/initiatives	
DPSIR framework	
Link to anthropogenic pressure	
Sustainability target or threshold	
Link with other assessment tools	
Example of integrated assessment	
Scope for future improvements	
Indicator references (i.e. UNEP, EEA, …)	

4.1. Identifiers management

An important issue in the harmonisation process is the *Identifier management*. As ruled in INSPIRE, we propose a Unique identification of spatial objects, provided by external object identifiers, i.e. identifiers published by the responsible data provider (or, in the PEGASO framework, created by the partners) with the intention that they may be used by third parties to reference the spatial object within INSPIRE.

Unique identifiers of spatial objects consist of two parts:

— A namespace to identify the data source. The namespace is owned/created by the data provider
— A local identifier, assigned by the data provider. The local identifier is unique within the namespace, i.e. no other spatial object carries the same unique identifier

A hierarchical structure is encoded in the namespace.

— a) namespace: country.PEGASO. nº partner.indicator Type.nº-indicator (if the indicator affects more than one country, the first part of the namespace should be “World”)
— b) code UDDI of the record or other local code

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Figure 2. Physical data model for Generic level indicator (Access table)

Name	Texto
PolicyObjective	Texto
PEGASOIDentifier	Texto
Objective	Texto
ICZM Policy Objective	Texto
ICZM ProtocolArticle	Texto
Relevance	Texto
EcologicalObjective	Texto
ReportingUnit name	Texto
ReportingUnit source	Texto
ReportingPeriod	Texto
BeginLifespanversion	Fecha/Hora
EndLifespanversion	Fecha/Hora
Factsheet Link	Texto
Nº_of_ranges	Número
Base color	Texto

Note: one instance for each indicator type.

Figure 3. Physical /Logical data model for specific level indicator

SpecificLevelIndicator *[1:1]* *ReportingUnits*

Name	Texto
PolicyObjective	Texto
PEGASOGenericIDentifier	Texto
PEGASO Specific ID	Texto
Value	Número
ReportingPeriod	Texto
BeginLifespanversion	Fecha/Hora
EndLifespanversion	Fecha/Hora
ReportingUnit ID	Texto

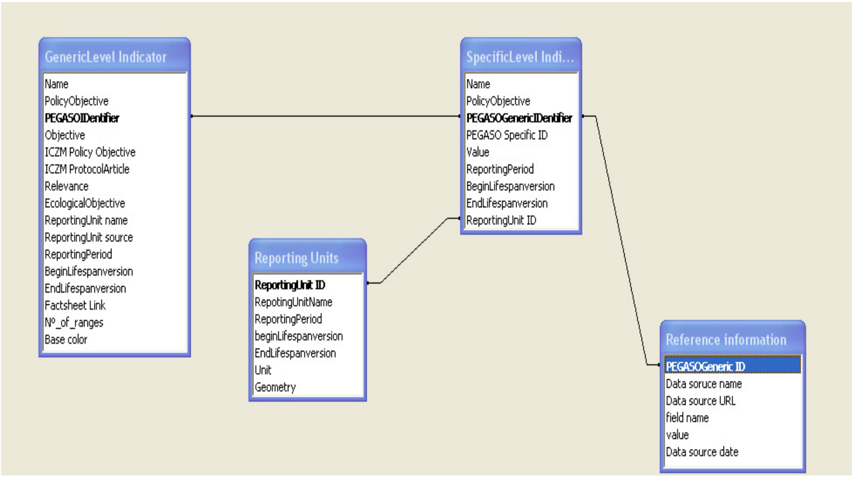
ReportingUnit ID	Texto
RepotingUnitName	Texto
ReportingPeriod	Texto
beginLifespanversion	Fecha/Hora
EndLifespanversion	Fecha/Hora
Unit	Texto
Geometry	Objeto OLE

ReferenceInformation

PEGASOGeneric ID	Texto
Data soruce name	Texto
Data source URL	Texto
field name	Texto
value	Número
Data source date	Fecha/Hora

Note: one instance for partner, reporting unit, scale. (Access tables).

Figure 4. Data architecture for PEGASO Indicators E-R Diagram based on MS Access DB



5. Methodology for creating harmonized indicators

5.1.1. What to define for each indicator

For each type of Indicator (GenericLevel) the Reporting Units to be used and the different scales and related ReportingUnits whether applicable, shall be defined. WP2 will define, in the Fact Sheet of each Indicator, which will be these Reporting Units.

See Data model. An informatics tool (MS Access, for example) should be created to help partners to collect, edit and store data in appropriate files.

Every instance of the partner file will be referenced by and *Identifier*, which will be the link to the correspondent Reporting Unit Identifier. The Indicator Identifier should respect similar rules than those described for R.U.:

- ID = country.PEGASO. nºpartner .indicatorType.nº-indicator [+] Local code

References (links) to fact sheets and Metadata registers are suggested.

5.1.2. How to collect data, how to send it (spatial objects and attributes)

Once the data (indicator) has been created, the file shall be joined with the corresponding Reporting Unit, and published in the partner's Geonode Services WMS / WCS / WFS. From WFS services the downloading of GML files will be made available, and GML schema as well.

Data to be published encompass the reference data which has been used to calculate the indicator Value (or status). These data will be collected in independent files, as indicated in the Data Model.

5.1.3. Creating Factsheets and Metadata

Every file, which corresponds with a specific indicator at partner level, shall be described by a data Metadata. The partner services which allow the access to this data have to be described by means of a Service Metadata. Metadata will be published in a standard CSW Catalogue, in the Central Geoportal and, when possible, in the local partner catalogue, and Factsheets in any folder in the Central Geoportal. (Deliverable D.3.2.1 Link to the document).

7.- Examples of spatial object references

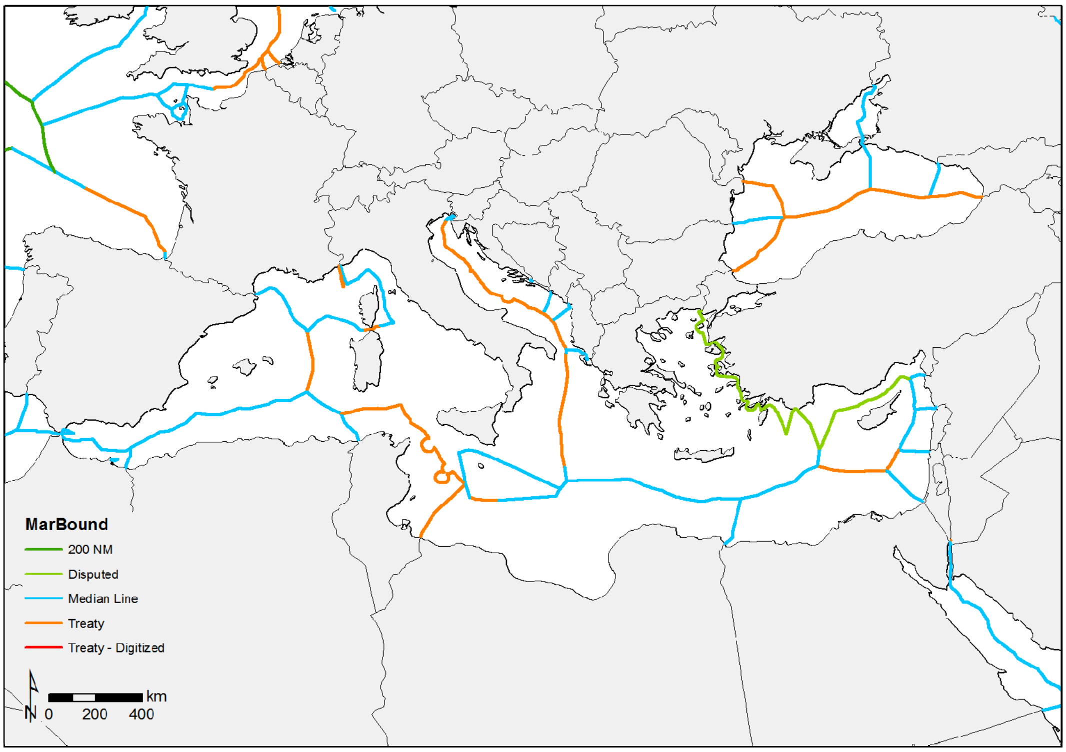
7.1.1. Maritime units

More information and shapefiles can be found on:
http://www.vliz.be/vmdcdata/vlimar/downloads.php

7.1.2. Administrative

VLIZ Maritime Boundaries Geodatabase, MarBound

This dataset represents Exclusive Economic Zones (EEZ) of the world. Up to now, there was no global public domain cover available. Therefore, the Flanders Marine Institute decided to develop a geospatial database. The database includes two global GIS-layers: one contains polylines that represent the maritime boundaries of the world countries, the other one is a polygon layer representing the Exclusive Economic Zone of countries. The database also contains digital information about treaties.



Known issue: Not all countries in the Mediterranean or Black Sea have claimed an Exclusive Economic Zone. In our geodatabase an EEZ is allocated based on the median line between two countries. Other regulations, like the territorial seas (12 nm) and contiguous zones (24 nm), are not included in the Geodatabase.

Overview of the claims in the Mediterranean and Black Sea in appendix 1 (https://www.cia.gov/library/publications/the-world-factbook/fields/2106.html).

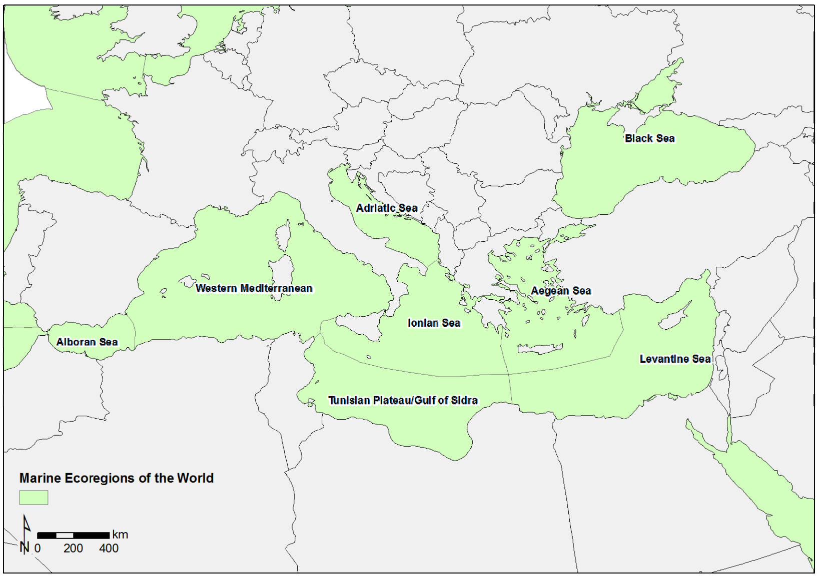
7.1.3. Physical

<u>IHO Sea Areas</u>

This dataset represents the boundaries of the major oceans and seas of the world. The source for the boundaries is the publication 'Limits of Oceans & Seas, Special Publication No. 23' published by the IHO in 1953.

<u>Marine Ecoregions of the World</u>

MEOW is a biogeographic classification of the world's coasts and shelves. It is the first ever comprehensive marine classification system with clearly defined boundaries and definitions and was developed to closely link to existing regional systems. The ecoregions nest within the broader biogeographic tiers of Realms and Provinces.



MEOW represents broad-scale patterns of species and communities in the ocean, and was designed as a tool for planning conservation across a range of scales and assessing conservation efforts and gaps worldwide. The current system focuses on coast and shelf areas (as this is where the majority of human activity and conservation action is focused) and does not consider realms in pelagic or deep benthic environment. It is hoped that parallel but distinct systems for pelagic and deep benthic biotas will be devised in the near future.

The project was led by The Nature Conservancy (TNC) and the World Wildlife Fund (WWF), with broad input from a working group representing key NGO, academic and intergovernmental conservation partners. (source: http://www.worldwildlife.org/science/ecoregions/marine/item1266.html)

ICES Ecoregions

ICES Ecoregions are large-scale management units for the ICES regional seas and are used in advisory reports to segment advice into the different sea areas. The Ecoregions were first referenced by the predecessor to ACOM (Advisory Committee) in 2004 (source: http://www.ices.dk/InSideOut/mayjun09/j.html).

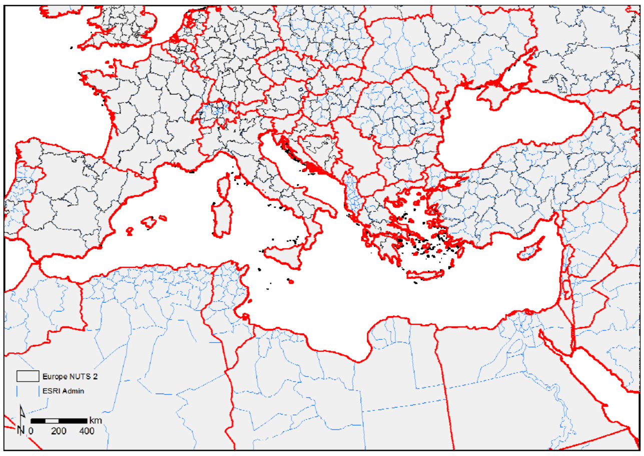
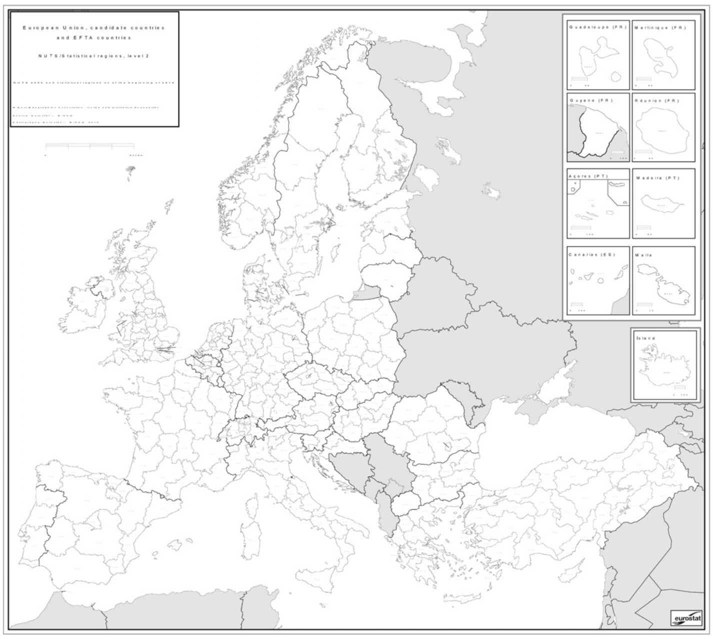
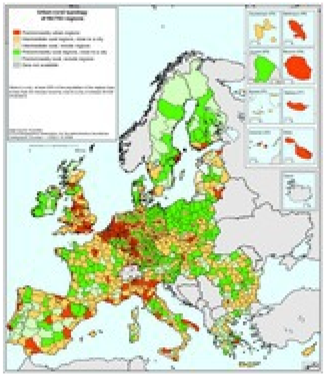


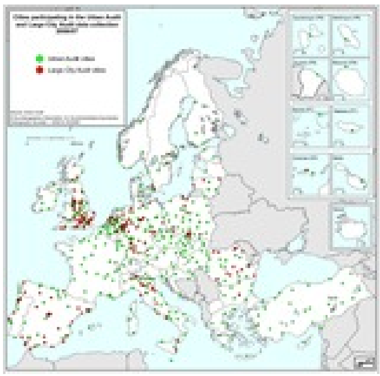
Figure 5. NUTS 2006 and statistical regions as at the beginning of 2010

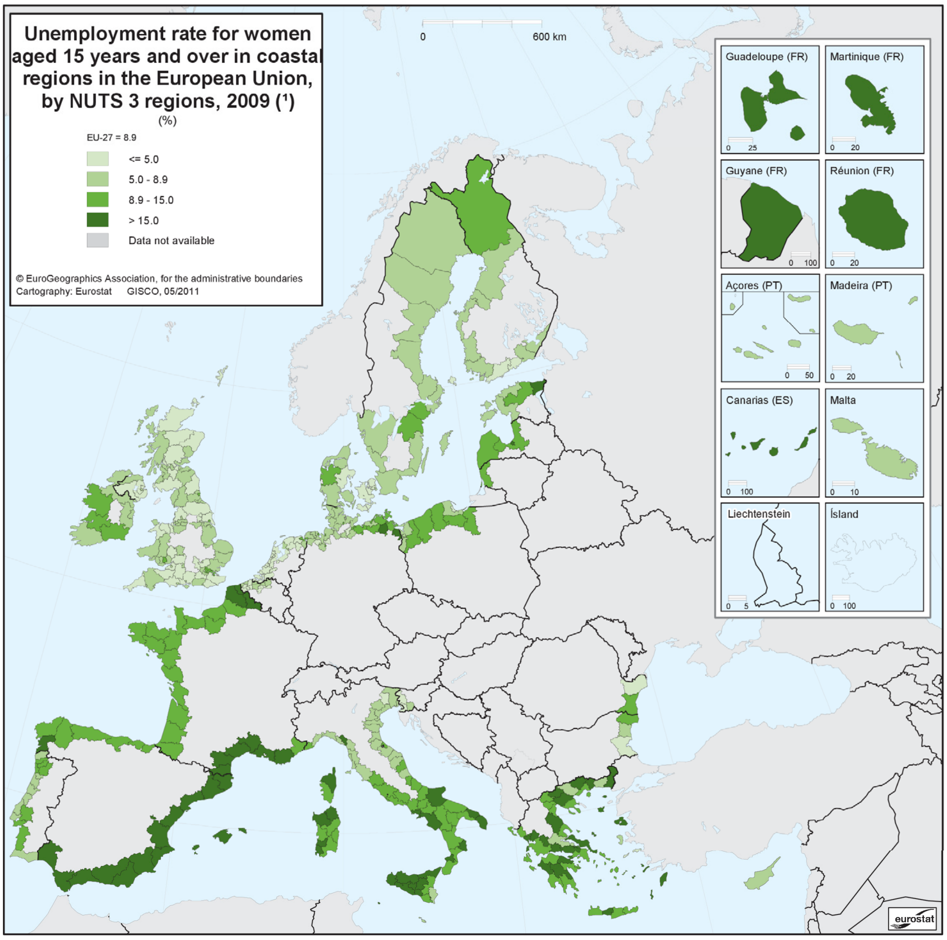


Urban-rural typology of NUTS3 regions



Cities participating in the Urban Audit and Large City Audit data collection 2006/2007





(¹) Bulgaria, Malta and Finland, 2008; Portugal and France, 2007; Belgium, 2006.

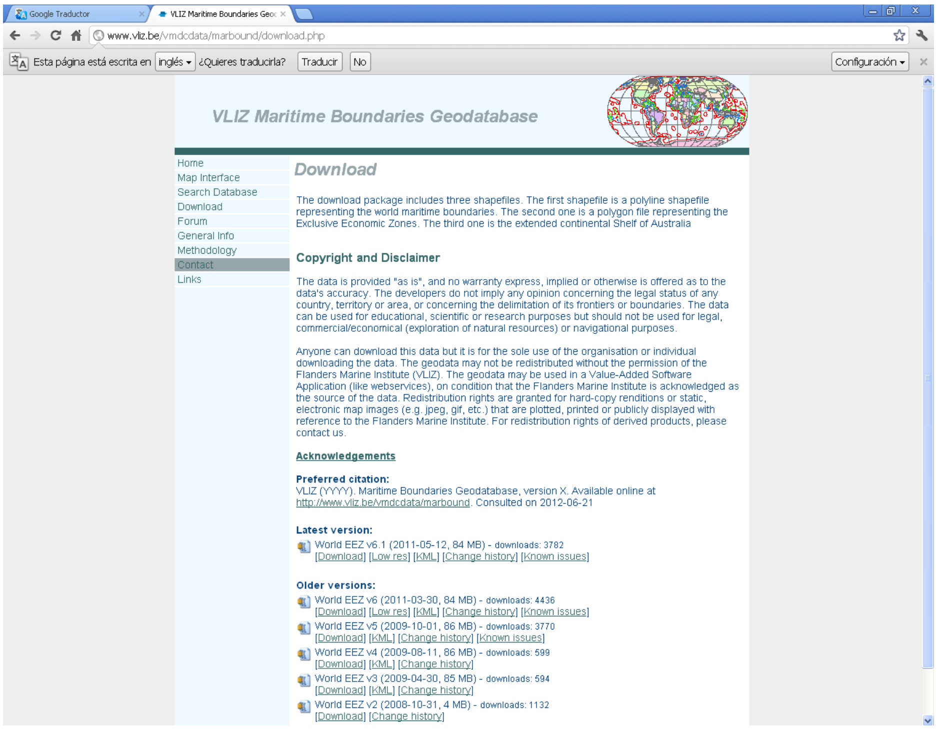
Source: Eurostat (online data code: lfst_r_lfu3rt)

7. 1.4. Cases

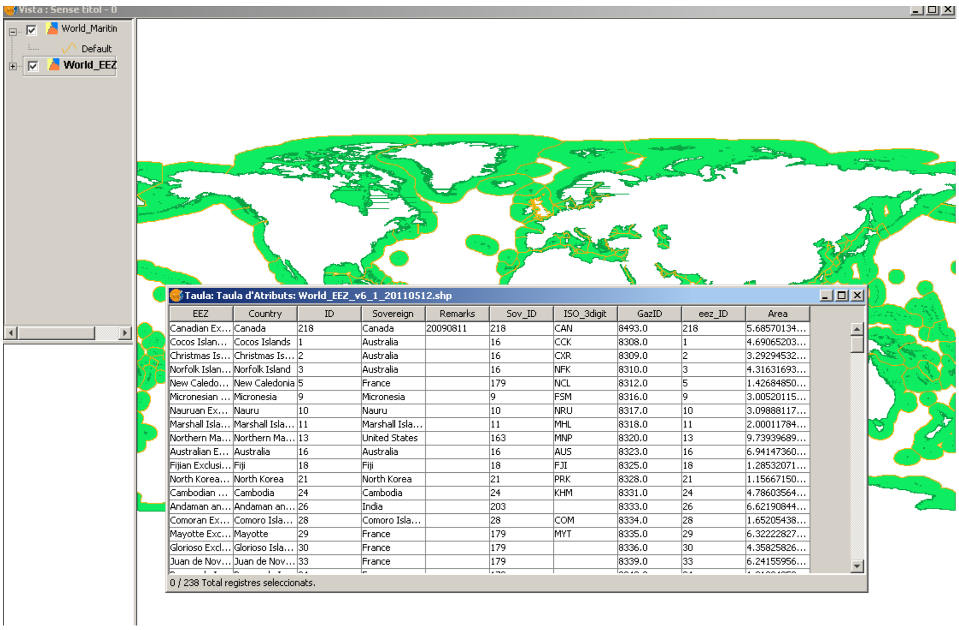
1.- Obtaining sea regions boundaries from IHO data:

Go to this webpage: http://www.vliz.be/vmdcdata/marbound/download.php (from ANNEX V of Deliverable D.3.2.1).

2. Download the last version of World EEZ.



3.- Load the shape file in a GIS software (gvSIG, in this case). Visualice the contents.



4.- Delete columns of attributes, and create a new column containing a PEGASO ID (PEGASO identifier) as described before, and add several columns for temporal aspects control and others:

PEGASO Identifier *ReportingUnit ID NameSpace + RU ID LocalCode*

Reporting Unit Name *“sea regions”*
Reporting Period *(unknow)*
Begin lifespan version *1994*
End lifespan version
Related Reporting Information *URL: http://www.geolocaliztions.cat/docPEgasosalinity*
Related Reporting Information *URL: http://www.geolocaliztions.cat/docPEgasocontamination*
Related Reporting Information *URL: http://www.geolocaliztions.cat/docPEgasotraffic*

4.- Now you have a file –Reporting Unit, related to the boundaries of sea regions, which can be used (joining files) by different indicators:

Name (SeaRegions+Country)	ReportinUnit ID NS	RU ID LocalCode	Geometry	Name	Period	BeginLS	EndLS
Canada Sea Region	World.PEGASO.01.2.13	218	GML Poly	Sea Regions		01/01/1994	
Cocos Islands Sea Region	World.PEGASO.01.2.13	1	GML Poly	Sea Regions		02/01/1994	
Christmas Island Sea Region	World.PEGASO.01.2.13	2	GML Poly	Sea Regions		03/01/1994	
Norfolk Island Sea Region	World.PEGASO.01.2.13	3	GML Poly	Sea Regions		04/01/1994	
New Caledonia Sea Region	World.PEGASO.01.2.13	5	GML Poly	Sea Regions		05/01/1994	
Namaburu Sea Region	World.PEGASO.01.2.13	9	GML Poly	Sea Regions		06/01/1994	
Nauru	World.PEGASO.01.2.13	10	GML Poly	Sea Regions		07/01/1994	
Marshall Islands	World.PEGASO.01.2.13	11	GML Poly	Sea Regions		08/01/1994	
Northern Mariana Islands and Guam	World.PEGASO.01.2.13	13	GML Poly	Sea Regions		09/01/1994	
Australia	World.PEGASO.01.2.13	16	GML Poly	Sea Regions		10/01/1994	
Fiji Sea Region	World.PEGASO.01.2.13	18	GML Poly	Sea Regions		11/01/1994	
North Korea	World.PEGASO.01.2.13	21	GML Poly	Sea Regions		12/01/1994	
Cambodia	World.PEGASO.01.2.13	24	GML Poly	Sea Regions		13/01/1994	
Andaman and Nicobar	World.PEGASO.01.2.13	26	GML Poly	Sea Regions		14/01/1994	
Comoro Islands	World.PEGASO.01.2.13	28	GML Poly	Sea Regions		15/01/1994	
Mayotte	World.PEGASO.01.2.13	29	GML Poly	Sea Regions		16/01/1994	
Glorioso Islands	World.PEGASO.01.2.13	30	GML Poly	Sea Regions		17/01/1994	
Juan de Nova Island	World.PEGASO.01.2.13	33	GML Poly	Sea Regions		18/01/1994	
Bassas da India	World.PEGASO.01.2.13	34	GML Poly	Sea Regions		19/01/1994	
Ile Europa	World.PEGASO.01.2.13	35	GML Poly	Sea Regions		20/01/1994	
Ile Tromelin	World.PEGASO.01.2.13	36	GML Poly	Sea Regions		21/01/1994	
Mauritius	World.PEGASO.01.2.13	37	GML Poly	Sea Regions		22/01/1994	

The values of the Indicator “salinity” are collected in the new file:

ReportinUnit ID NS	RU ID LocalCode	Generic ID	Name	Period	BeginLS	EndLS	PoliceObjectiv	Value
World.PEGASO.01.2.13	218	II13	Salinity	2000-2012	01/12/2012		Sea PH control	5
World.PEGASO.01.2.13	1	II13	Salinity	2000-2012	01/12/2012		Sea PH control	5
World.PEGASO.01.2.13	2	II13	Salinity	2000-2012	01/12/2012		Sea PH control	5
World.PEGASO.01.2.13	3	II13	Salinity	2000-2012	01/12/2012		Sea PH control	5
World.PEGASO.01.2.13	5	II13	Salinity	2005-2009	01/12/2012		Sea PH control	5
World.PEGASO.01.2.13	9	II13	Salinity	2005-2010	01/12/2012		Sea PH control	5
World.PEGASO.01.2.13	10	II13	Salinity	1995-2000	01/12/2012		Sea PH control	7
World.PEGASO.01.2.13	11	II13	Salinity	1995-2001	01/12/2012		Sea PH control	7
World.PEGASO.01.2.13	13	II13	Salinity	1995-2002	01/12/2012		Sea PH control	7
World.PEGASO.01.2.13	16	II13	Salinity	1995-2003	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	18	II13	Salinity	1995-2004	01/12/2012		Sea PH control	6
World.PEGASO.01.2.13	21	II13	Salinity	1995-2005	01/12/2012		Sea PH control	6
World.PEGASO.01.2.13	24	II13	Salinity	2000-2012	01/12/2012		Sea PH control	6
World.PEGASO.01.2.13	26	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	28	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	29	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	30	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	33	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	34	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	35	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	36	II13	Salinity	2000-2012	01/12/2012		Sea PH control	4
World.PEGASO.01.2.13	37	II13	Salinity	2000-2012	01/12/2012		Sea PH control	6.5

5. Now it is possible to make a join of both files: Reporting Units and Salinity Indicator, since they share a common Identifier column (ReportingUnit ID NS + RU ID LocalCode). Other Indicators can be also joined to the same Reporting Units.

8. References

Draft documents from INSPIRE:

INSPIRE Data Specification on *Area management/restriction/regulation zones and reporting units*. D2.8.III.11_v2.0 / 2011-06-20

INSPIRE Data Specification on *Statistical units*. D2.8.III.1_v 2.0 / 2011-06-20

INSPIRE Data Specification on *Population Distributrion – Demography*. D2.8.III.10_v 2.0.1 / 2011-07-13

INSPIRE Data Specification on *Sea Regions*. D2.8.III.16_v2.0 / 2011-06-20

INSPIRE Data Specification on *Habitats and Biotopes*. D2.8.III.18_v2.0 / 2011-06-15

INSPIRE Data Specification on *Bio-Geogrpahical Regions*. D2.8.III.17_v2.0 / 2011-06-15

INSPIRE Specification on *Geographical Grid Systems.* IS-GGS – v3.0

Other Documents:

http://epp.eurostat.ec.europa.eu/portal/page/portal/gisco_Geographical_information_maps/geodata/reference

Deliverable D.3.1. "*Report on the inventory of Participants and main relevant EU Projects data and SDI, with a Quality assessment and identification for needed actions on harmonisation tasks*". Available on the intranet Link to the document